

THE REVOLUTIONARY FIRESTORM SPARK PLUG

by Robert Stanley © October 2004

During the past nine years while I was working as a market researcher for a major Japanese auto company, I learned that the price of oil worldwide would continue to climb higher due to a steadily growing demand for a limited supply. It was clear from the reports I read that this presented a very real problem to the auto companies of the world. There was a general agreement in the auto industry that the answers to the problem would come in the future via new technologies.

For years now, I have wondered where and when the next Edison with a bright idea will appear and invent a "lean, green, driving machine". I have finally found such a man. He lives in Farmington Hills, Michigan, and his name is Robert Krupa.

We have all heard the saying, "If something sounds too good to be true, it usually is". The amazing new spark plug designed by Mr Krupa, which he named "FireStorm", is the exception to this rule.

I know that when it comes to buying spark plugs, they are all basically the same except for the price. So, why make a big deal about another new spark plug?

FireStorm's Capabilities

First, let's look at what Krupa's FireStorm spark plugs give an internal combustion engine:

- More horsepower;
- 44-50% increase in mpg;
- Dramatic decrease in emissions.

Second, let's see what FireStorm plugs eliminate:

- Smog pump;
- Catalytic converter;
- Radio frequency interference (RFI) and the use of resistors in the centre electrode;
- Gap growth;
- Exhaust gas recirculation (EGR) systems;
- Misfire/hesitation/detonation/stutter and stumble.

How, you may ask, is all this achieved?

In a word, *plasma*. The revolutionary design of FireStorm spark plugs creates an electric plasma that fills the entire combustion chamber like a firestorm. It allows you to take an internal combustion engine from the standard 14.7:1 air-to-fuel ratio to an incredibly lean 24:1. At this ratio, all the air/fuel mixture is burned much more efficiently without increasing heat, thus giving an engine more power and fuel economy while creating much less pollution. That's the good news

The bad news is that you can't buy a set of FireStorm spark plugs anywhere right now. No spark plug company wants to make them.

Robert Krupa is no stranger to the way the automotive industry and spark plug industry operate. He has worked as a technician, then as an engineer for GM and Ford.

Krupa explained: "Before I entered college and earned a BS [Bachelor of Science] in engineering, I was taking electrolytic capacitors and mounting them to the plus side of a distributor, which would smooth out the electrical pulses going to the distributor and the spark plugs. With that little improvement, I was able to make cars run smoother. So, that was the start of this engineering journey I am now on.

"I have an electrical background that's very heavily into automotive applications. I have an extreme sensitivity to mechanical noise. I can listen to an engine running and tell exactly what's wrong with it. My hearing is so keen that when I worked at General Motors they sent me to Mexico and to Germany and New York to fix engine assembly plants. When I went to New York, they were having problems with engines going in the repair loop. So I looked at what they were doing, thought a while, then made changes to 22 machines and got the engine plant running faster than design intent. The plant manager offered me a job right on the spot."

Krupa knows spark plugs and has worked very hard to bring improved designs to the automotive market. Although it was not his design, he is solely responsible for bringing the "SplitFire"



Figure 1 (above) and Figure 2 (below):
Close-ups of the FireStorm spark plug.

spark plug to the market over a decade ago. It was a simple variation on standard plugs which featured a split electrode, designed like a snake's tongue, that increased the sparking area of the plug somewhat. It cost more than an average spark plug and generated annual sales of US\$60 million in 1993.

As fate would have it, Robert Krupa became friends with the legendary Henry "Smokey" Yunick, of Daytona Beach, Florida. Smokey was a Hall of Fame NASCAR stock car and IndyCar builder, entrepreneur and inventor extraordinaire. They met while working on a project for GM. At that time, Smokey was having a little bit of trouble hearing. So Krupa set up a knock module and sensor and hooked



it up to an oscilloscope for Smokey to use. The next morning, Smokey asked Krupa to come and work for him. Krupa politely turned Smokey down, but the end result was they became good friends.

Because of this, Krupa decided to take his first prototype of the FireStorm to Smokey. While witnessing the new spark plug firing on a portable test stand, Smokey declared: "After 30 years consulting for Champion, I have never seen a spark plug fire like yours. You are going to turn the automotive industry on its ear!"

With that endorsement, Krupa knew he had a winner. That afternoon, he signed Smokey up as a consultant to Krupa's newly formed company, Century Development International Limited.

Genesis of the FireStorm

It was Krupa's unwavering determination to discover a better plug that led to the technical breakthrough of the first FireStorm prototype back in November 1996. When asked about that life-changing event, Krupa recalled:

"I was brought up by the NOS [nitrous oxide systems] Racing guys in California. Their theory was a spark plug either works or it doesn't and there is no in-between. After a lot of investigation, I essentially found out that there was something special about spark plugs.

"During this time, I went through a 55-gallon drum full of grimy used spark plugs. I inspected them all very carefully and found that the older the model of spark plug was, the more the centre electrode of the plug was worn all around the side. It took the shape of a small ball. It was a half a ball—a dome shape, to be exact.

"That's when I thought, 'If that's what the spark plug wants to be, then why not start off with that shape and see what it does?' So, I took a brand new plug and filed it down into the shape of a dome and fired it and noticed it worked a little bit better. But I still had a problem with the grounding side. Next, I whacked the ground off and started putting different configurations of grounding electrodes on it, and I held everything together with toothpicks to make it easier to change.

"When I put a half a loop on the grounding side, it seemed to fire a little better. Then I took the head of a screw and bashed it with a hammer until it took a dome shape. Then I took the other side and dimpled it, creating a concave—an inverted dome, really. I carefully balanced that bat-

tered dome on top of the electrode of the new plug that I had filed to accommodate it, and then I put a half a ring over it for the negative electrode, again holding all that together with toothpicks. And when it started firing, the amount of energy coming off the plug was just crazy, and I said to myself, 'I've really got something here!'

"But I was inspired to do this because I just knew there had to be a better way. That's why spark plug companies hate me. They've got millions and millions of dollars tied up in research departments and I was able to come up with the FireStorm prototype in my basement in just under two hours."

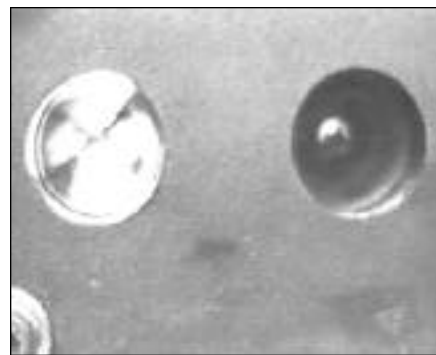


Figure 3: The FireStorm is being fired next to a standard plug in a working test.

Performance and Testing

When I asked Krupa if there were any other advantages to using FireStorm spark plugs, he explained: "If there is a vehicle that requires premium fuel and they install FireStorm plugs and perform the modifications I suggest...they could run regular fuel in the engine and it won't detonate, hesitate, ping or misfire. The only reason you need higher octane fuel is for higher compression engines. And if an engine is pulling a heavy load, it has a tendency to go into detonation with a regular spark plug."

This all seemed too good to be true, but there was more good news.

According to Krupa: "I know it sounds like smoke and mirrors. But this has all been documented. When I was doing some of the early testing on this, I hooked up an emissions analyser to the car and I had equipment in the car while changing air/fuel ratios and idle speeds. I was doing this at an automotive aftermarket speed shop. The guys were coming over to see what I was doing. I had the test vehicle running at 250 rpm! Engines do not like to idle at 250 rpm. You can't do that with a regular spark plug. But you can do it with the FireStorm plug."

I had never heard of anyone doing this before, and wondered what the engine would run like at that ultra-low idle—another major fuel-saving measure.

Krupa told me: "It just loped along really smooth, but it was constant. No hesitation; no misfires. And when I did that test on a T-bird and got a 44% increase in fuel economy, I was using the air conditioner at the time! And nobody uses the air conditioner when they test for fuel mileage. But, I was doing real-world testing. In fact, the EPA is thinking about revising their air/fuel testing so that it reflects real-world driving conditions. And even with the increased fuel mileage, I got 33 more horsepower out of a big-block Chevy just by adding FireStorm spark plugs and adjusting the tuning of the engine.

"The other amazing thing I discovered while testing the FireStorm plug was that an engine can run further out in the rpm range. In other words, when they reach extremely high speeds the power curve starts falling off. Just by using FireStorm plugs, I can operate from 600 to 800 rpm faster past red-line with the power curve still heading up rather than down.

"Bottom line, I can pull more rpm and power out of an engine and still deliver better fuel economy because even at extremely high speeds of operation the FireStorm plugs still produce plasma that burns all the fuel in the combustion chamber. A regular plug, with its itty-bitty little spark, can never fire well in a combustion chamber that's running at high speed. That size spark can't keep up with the increased speed flow of air/fuel mixture."

Krupa showed me an amazing video of the FireStorm spark plugs running in real time on a test rig. I noticed that the powerful plasma field coming from his spark plug filled the combustion chamber, but there was something else. It appeared that the plasma was swirling around like a small whirling tornado.

When asked about this, Krupa explained: "I have coined the term *residual ionisation* to describe the effect of the firing of the FireStorm spark plug. When a generic spark plug fires in a pressure chamber or your vehicle, it will fire six to eight times and then misfire once. The misfire is caused by the residual ionisation left around the plug proper. When the charge comes down the centre electrode, it sees a high impedance and cannot jump the gap, hence a misfire.

[11]	Patent Number:	5,936,332
[45]	Date of Patent:	Aug. 10, 1999
<i>Primary Examiner—Ashok Patel Attorney, Agent, or Firm—Gifford, Kraus, Greh, Sprinkle, Anderson & Czikowski, P.C.</i>		
[57]	ABSTRACT	
A very unique universal bi-directional firing spark plug for any spark-ignited internal combustion engine is described. This spark plug eliminates misfire and improves gas mileage, peaks engine performance, horsepower, and increases the RPM range. This unique spark plug is made of an elongated or non-elongated body with an electrical connector at one end. An absolute aerodynamic semi-spherical dome or sphere electrode is secured to the other end of the body. At least one absolute aerodynamic semi-circular electrode is also secured to the body adjacent to the dome or sphere electrode such that the semi-circular electrode has its inner surface equidistantly spaced from the dome or sphere electrode's surface. The electrodes can be fabricated from various metals, alloys, and/or precious metals and can also be coated with various metals, alloys, and/or precious metals. Alternate embodiments of the invention include two, three or four or more semi-circular electrodes, all of which have a surface equidistantly spaced from the aerodynamic semi-spherical dome or sphere electrode along its complete arc length.		

"There is also residual ionisation left over in a FireStorm spark plug. However, because of the huge surface area in the configuration of the domed centre electrode and the triaxial ground system, when the residual ionisation rears its ugly head the charge coming down the centre electrode sees it and moves to the next area under the triaxial ground system that is residual ionisation free. That's why the plasma appears to move around the dome in a circular motion."

Acclaim and Potential

Krupa's new FireStorm spark plug is in a league all of its own. It has received rave reviews from a major spark plug company. Krupa explained: "Bosch conducted an eight-week-long durability test of my FireStorm plugs against their best, and they said that the FireStorm plugs produced zero per cent gap growth. And they predicted that [the plugs] will never wear out."

That might be one reason spark plug companies are not interested in manufacturing the FireStorm. Another big reason is that the currently used standard design of spark plugs would rapidly become obsolete. However, the main reason no spark plug manufacturer is willing to make the FireStorm is that there is no way anyone can create a knock-off that gets around Krupa's worldwide patents on his designs.

According to Krupa: "What we did was sit down and decide what the best configuration was for firing. Then we set that aside and for the next seven months we

designed knock-offs and incorporated every one of them into the patent."

A final important factor to consider is financial. Most spark plug manufacturing plants are over 100 years old. They would need to invest vast amounts of money to retool before producing the FireStorm design because standard centre electrodes in generic plugs are manufactured in three parts. The FireStorm spark plug's centre electrode is only made of one part. Because of this, Krupa's company, CDI Limited, has decided it will have to manufacture the FireStorm plugs on its own. This is a massive undertaking that Krupa and his team did not initially plan for, but it has created a once-in-a-lifetime opportunity for venture capitalists and investors to get on board early.

Consider this: annually, there are over six billion spark plugs made and sold worldwide. Krupa's team at CDI Limited estimates that the FireStorm spark plug will cost US\$1.50 per unit initially to manufacture. The team also estimates that once FireStorm spark plugs become available, they will quickly capture 80% of the market share—even if they cost \$10.00 or more per plug. That equals a lot of money.

Moreover, an enormous amount of money will be saved by consumers when they fill up their gas tanks—even as fuel prices continue to rise. This will have a positive impact on the world's economy. And it couldn't come at a better time. In a recent report, Bill Powers, the editor of an investment newsletter called *Canadian Energy Viewpoint*, predicts that the price of crude oil will reach US\$80 per barrel in the next 24 months! (See web page <http://www.financialsense.com/editorials/powers/2004/1104.html>.)

When asked if there were any conditions he required of future business partners, Krupa stated: "Well, we would have to sit down and talk about the details and see what they want and work out a deal that everyone agrees on. And no matter who's going to be involved, I would like to be in charge of the quality control end of the manufacturing. Because if you don't make it right, then it's like shooting yourself in the foot before a race."

Much like Edison, who refused to rest until he'd invented a better light bulb, Robert Krupa was inspired and determined to invent a better spark plug. In so doing, he has given the internal combustion engine and our environment a brighter future.

When asked about the legacy of his life's work, he proudly said: "I tell people I took the lowly spark plug from the Stone Age to the Space Age."

About the Inventor

Inventor Robert Krupa is an accomplished engineer and scientist who specialises in electrical and mechanical media. He's travelled around the world four times and has been featured on TV, radio and in magazines. He has also written many articles for the "hot-rod" world. Robert Krupa can be emailed at flamefromwater@yahoo.com. Visit the FireStorm web page at <http://www.robertstanley.biz/firestorm.htm>.

About the Author

Robert M. Stanley is a writer and researcher specialising in technology trends. His last article for NEXUS was an interview with space technology consultant David Adair (see 9/05). His article on Robert Krupa is copyright © 29 October 2004, *UNICUS*, 1147 Manhattan Avenue #43, Manhattan Beach, CA 90266, USA. Robert Stanley can be emailed at rstanley@socal.rr.com.

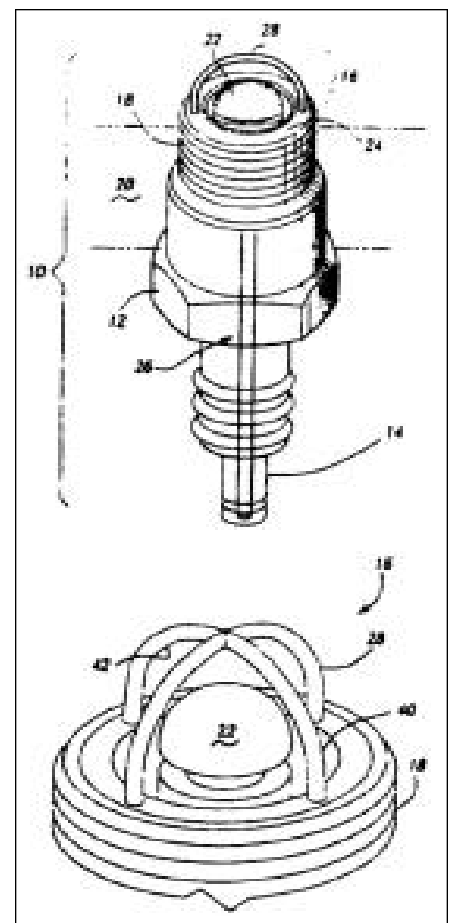


Figure 4 (top left): FireStorm patent abstract. Figure 5 (above): Patent design.